

## CLAIMS

What is claimed is:

1. A pedicle screw assembly comprising: ✓

5 a pedicle screw having a pair of spaced-apart threaded posts extending along a longitudinal axis thereof and defining a channel therebetween;

a ball collet comprising a generally spherical body having a ball collet bore formed therethrough, the ball collet being insertable along the longitudinal axis and into the channel;

10 a rod having first and second ends, the first end of the rod being insertable into said ball collet bore; and

a threaded cap configured and dimensioned to mate with the threaded posts, wherein the assembly is adjustable between a disassembled state in which the pedicle screw, ball collet, rod and cap are not secured to one another, and an assembled state in which:

the ball collet is seated in the channel;

the rod is gripped by an inner surface of the ball collet bore; and

the cap is screw-coupled to the post.

20 2. The assembly according to claim 1, wherein the threaded cap comprises:

a crown having a cylindrical skirt and a radially inwardly projecting flange; and

a clamping screw having a threaded portion configured and dimensioned to pass through said flange.

25 3. The assembly according to claim 2, wherein, when the assembly is in the assembled state:

the cylindrical skirt encircles upper portions of the threaded posts; and

the radially inwardly projecting flange overlays axially directed end surfaces of the posts.

4. The assembly according to claim 1, wherein the threaded cap has a concave lower contacting surface with a spherical contour, the concave lower contacting surface abutting the ball collet, when the assembly is in the assembled state.

5 5. The assembly according to claim 1, wherein the pedicle screw is provided with a concave seat having a spherical contour.

6. The assembly according to claim 1, wherein the posts of the pedicle screw are provided with threads on inner surfaces thereof.

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7. The assembly according to claim 1, wherein the ball collet is provided with a plurality of slots spaced about a periphery thereof, each slot connecting an outer surface of the ball collet with the ball collet bore.

15 8. The assembly according to claim 6, wherein each slot extends in an axial direction along a body axis of the ball collet.

9. The assembly according to claim 6, wherein each slot communicates with a single end of the ball collet bore and alternating slots communicate with opposite ends of the  
20 ball collet bore.

10. The assembly according to claim 1, wherein the second end of the rod is provided with a spherical ball member.

25 11. The assembly according to claim 10, wherein a diameter of the spherical ball member is similar to a diameter of the ball collet.

12. The assembly according to claim 1, wherein the second end of the rod is provided with a partial hemispherical ball member having a convex surface facing an inboard side  
30 of the second end.

13. The assembly according to claim 12, wherein the convex surface of the partial hemispherical ball member follows a spherical contour belonging to a sphere having a diameter similar to a diameter of the ball collet.

5 14. The assembly according to claim 12, wherein the second end of the rod is provided with a conical surface facing an outboard side of the second end.

15. The assembly according to claim 12, wherein the partial hemispherical ball member has a centrally located protrusion facing an outboard side of the second end.

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16. The assembly according to claim 12, wherein the partial hemispherical ball member has a centrally located recess facing an outboard side of the second end.

17. A pedicle screw assembly comprising: /

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first and second pedicle screws, each pedicle screw having a longitudinal axis and a pair of spaced-apart threaded posts extending therealong, each pair of threaded posts defining a channel therebetween;

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a ball collet comprising a generally spherical body having a ball collet bore formed therethrough, the ball collet being insertable into the channel of the first pedicle screw along the first pedicle screw's longitudinal axis;

a rod having a first end and a bulbous second end, the first end of the rod being insertable into said ball collet bore, and the bulbous second end being insertable into the channel of the second pedicle screw along the second pedicle screw's longitudinal axis; and

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first and second threaded caps configured and dimensioned to mate with the threaded posts of respective first and second pedicle screws,

wherein the assembly is adjustable between a disassembled state in which the first and second pedicle screws, ball collet, rod and caps not secured to one another, and an assembled state in which:

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the ball collet is seated in the channel of the first pedicle screw;  
the rod is gripped by an inner surface of the ball collet bore;

the bulbous second end of the rod occupies the channel of the second pedicle screw; and

the first and second caps are screw-coupled to the threaded posts of respective first and second pedicle screws.

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18. The pedicle screw assembly according to claim 16, wherein the bulbous second end comprises a spherical ball member.

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19. The pedicle screw assembly according to claim 17, wherein a diameter of the spherical ball member is similar to a diameter of the ball collet.

20. A pedicle screw assembly comprising:

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first, second and third pedicle screws, each pedicle screw having a longitudinal axis and a pair of spaced-apart threaded posts extending therealong, each pair of threaded posts defining a channel therebetween;

first and second ball collets, each comprising a generally spherical body having a ball collet bore formed therethrough, the ball collets being insertable into the channels of respective first and second pedicle screws along corresponding longitudinal axes;

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a first rod having a first end insertable into the ball collet bore of the first ball collet, and a first rod second end provided with a first partial hemispherical ball member, the first partial hemispherical ball member having a convex surface facing an inboard side of the first rod second end, and a centrally located protrusion facing an outboard side of the first rod second end;

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a second rod having a first end insertable into the ball collet bore of the second ball collet, and a second rod second end provided with a second partial hemispherical ball member, the second partial hemispherical ball member having a convex surface facing an inboard side of the second rod second end, and a centrally located recess facing an outboard side of the second rod second end; and

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first, second and third threaded caps configured and dimensioned to mate with the threaded posts of respective first, second and third pedicle screws,

wherein the assembly is adjustable between a disassembled state in which the pedicle screws, ball collets, rods and caps are not secured to one another, and an assembled state in which:

the first and second ball collets occupy channels of the first and second pedicle  
5 screws, respectively;

the first rod is gripped by an inner surface of the first ball collet bore and the second rod is gripped by an inner surface of the second ball collet bore;

the first and second partial hemispherical ball members oppose one another within the channel of the third pedicle screw, with the protrusion at least partially entering the  
10 recess; and

the three caps are screw-coupled to the pairs of threaded posts of three pedicle screws.

21. The pedicle screw assembly according to claim 20, wherein the convex surfaces  
15 of the first and second partial hemispherical ball members opposing one another within the channel of the third pedicle screw together follow a spherical contour belonging to a sphere having a diameter similar to a diameter of either ball collet.

22. The pedicle screw assembly according to claim 20, wherein:  
20 the first rod second end is provided with a first conical surface facing an outboard side thereof; and  
the second rod second end is provided with a second conical surface facing an outboard side thereof.

23. A pedicle screw assembly comprising: /  
25 a pedicle screw having a pair of spaced-apart posts and a seat;  
a ball collet having a ball collet bore, said ball collet being seated on the pedicle screw;  
a rod gripped by an inner surface of the ball collet bore; and  
30 a cap coupled to the posts and applying a compressive force to the ball collet against the seat of said pedicle screw.

24. The assembly according to claim 23, comprising a one-piece pedicle screw formed from titanium or an alloy thereof and having a longitudinal axis, the one-piece pedicle screw comprising a threaded insertion portion aligned with said longitudinal axis, a top of the threaded insertion portion connected to a yoke portion including said pair of spaced apart posts, each post having an arcuate cross-section and defining a substantially cylindrical channel, end portions of the posts having radially inwardly facing threads, the seat being concave with a spherical contour and being situated at a base of the channel.

10 25. A pedicle screw assembly comprising:

a pedicle screw having a pair of spaced-apart threaded posts extending along a longitudinal axis thereof and defining a channel therebetween;

a first rod having a first rod end provided with a first partial hemispherical ball member, the first partial hemispherical ball member having a convex surface facing an inboard side of the first rod end, and a centrally located protrusion facing an outboard side of said first rod end;

a second rod having second rod end provided with a second partial hemispherical ball member, the second partial hemispherical ball member having a convex surface facing an inboard side of the second rod end, and a centrally located recess facing an outboard side of the second rod end; and

a threaded cap configured and dimensioned to mate with the pair of spaced-apart threaded posts,

wherein the assembly is adjustable between a disassembled state in which the pedicle screw, first and second rods and cap are not secured to one another, and an assembled state in which:

the first and second partial hemispherical ball members oppose one another within the channel of the pedicle screw, with the protrusion at least partially entering the recess; and

the cap screw-coupled to the pair of threaded posts.

26. The pedicle screw assembly according to claim 25, wherein:

the first rod end is provided with a first conical surface facing the outboard side of the first rod end; and

the second rod end is provided with a second conical surface facing the outboard  
5 side of the first rod end.

27. A one-piece pedicle screw formed from titanium or an alloy thereof, the one-piece pedicle screw comprising a threaded insertion portion aligned with said longitudinal axis, a top of the threaded insertion portion connected to a yoke portion comprising a pair of  
10 spaced apart posts, said posts having arcuate cross-sections and defining a substantially cylindrical channel, end portions of the posts having radially inwardly facing threads, a base of the channel being provided with a concave seat having a spherical contour.

28. The one-piece pedicle screw according to claim 27, in combination with a ball  
15 collet positioned in said concave seat.

29. The one-piece pedicle screw according to claim 28, wherein the ball collet comprises a generally spherical body formed from titanium or an alloy thereof, the body having a ball collet bore formed therethrough along a body axis, the body being provided  
20 with a plurality of slots spaced about a periphery thereof, each slot extending in an axial direction along the body axis and connecting an outer surface of the ball collet with the ball collet bore, each slot communicating with a single end of the ball collet bore and alternating slots communicating with opposite ends of the ball collet bore.

25 30. An orthopedic ball collet comprising a generally spherical body formed from titanium or an alloy thereof, the body having a ball collet bore formed therethrough along a body axis, the body being provided with a plurality of slots spaced about a periphery thereof, each slot extending in an axial direction along the body axis and connecting an outer surface of the ball collet with the ball collet bore, each slot communicating with a  
30 single end of the ball collet bore and alternating slots communicating with opposite ends of the ball collet bore.

31. The orthopedic ball collet according to claim 30, comprising two identical mating portions.

32. The orthopedic ball collect according to claim 31, wherein each mating portion  
5 comprises a resilient tongue having a convex inner surface configured to abut a surface of other mating portion.

33. A method of securing a rod in an orthopedic procedure comprising: /  
seating a compressible hollow object in a screw having threaded posts;  
10 inserting the rod into the compressible hollow object; and  
applying and tightening a cap to the threaded posts, thereby causing the hollow  
object to at least partially deform and grip the rod.